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6 **IN THE UNITED STATES DISTRICT COURT**
7 **FOR THE DISTRICT OF ARIZONA**
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9 United States of America,

10 Plaintiff,

11 v.

12 Theodore Kootswatewa,

13 Defendant.
14

No. CR-15-08034-001-PCT-DLR

ORDER

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16 The Government alleges that Defendant Theodore Kootswatewa, a Hopi adult,
17 sexually assaulted a Hopi girl inside an abandoned trailer owned by a Hopi woman on the
18 Hopi reservation. (Doc. 1.) Pursuant to Federal Rules of Evidence 702 and 403,
19 Defendant moves to preclude the Government's expert from testifying about the
20 probability of a random match of the Y-STR partial DNA profile identified on the victim.
21 (Doc. 77.) The Court held an evidentiary hearing on Defendant's motion on February 10,
22 2016. The Government and Defendant each presented one expert witness. The Court
23 admitted five exhibits: two from the Government and three from Defendant. For the
24 following reasons, the Court grants Defendant's motion.

25 **BACKGROUND**

26 Deoxyribonucleic acid ("DNA") is material found within cells throughout the
27 human body that contains the information necessary to make a human being. (Doc. 100
28 at 10.) DNA analysis requires a four-step process. (*Id.* at 13.) Step one involves

1 extraction of the DNA using chemicals to break open the cells. (*Id.*) Next, the quantity
2 of the DNA obtained from the sample is determined in a process called “quantitation.”
3 (*Id.*) Third, the examiner copies the relevant areas of the DNA using the “polymerase
4 chain reaction” (“PCR”). (*Id.*) Finally, the DNA is separated by size to generate a DNA
5 profile. (*Id.* at 13-14.) In criminal investigations, a DNA profile from cells found on a
6 victim can be compared with samples from suspects to determine whether there is a
7 match. (*Id.* at 14.) Because each person’s DNA is distinctive, the probability that a
8 random person’s DNA profile would match the crime scene sample is extraordinarily
9 low, sometimes one in several billion. (*Id.* at 10, 21-22.)

10 When a crime scene sample contains an excess amount of female DNA compared
11 to male DNA, examiners employ a different process called “Y short tandem repeat” (“Y-
12 STR”) DNA analysis. (*Id.* at 14.) The first two steps are the same as regular, autosomal
13 DNA analysis. (*Id.* at 15.) From there, the process differs by utilizing a special kit that
14 seeks out only the Y-chromosome, which is found only in males, instead of any of the
15 other 22 pairs of chromosomes found in the human body. (*Id.* at 14-16.) The Y-
16 chromosome DNA profile is then cross-referenced against a database of known samples
17 to generate a statistical estimate of the probability that the profile would be observed
18 randomly among certain populations. (*Id.* at 16-17.) This statistical calculation process
19 is known as the “counting method.” (*Id.* at 21.)

20 A man’s Y-chromosome is inherited entirely from his biological father. (*Id.* at
21 22-23.) Identical Y-chromosomes are likely to be shared not only by immediate family
22 members, such as fathers, sons, brothers and uncles, but also by very distant male
23 relatives whose family relationship has centuries ago been lost. (*Id.*) Because there are
24 fewer permutations when examining only the Y-chromosome than in the usual DNA
25 examination, the extraordinarily low statistical probability of a random match of a full
26 DNA profile does not exist with Y-STR analysis. (*Id.*) In other words, there are large
27 numbers of other individuals who likely share any man’s Y-chromosome. For this
28 reason, the results of Y-STR analysis only allow an examiner to determine whether a

1 crime suspect and his male paternal relatives can be excluded as contributors.

2 Specific Y-STR profiles are not likely to be evenly dispersed among populations
3 of the world. (*Id.* at 28-31.) Some populations have existed in relative isolation while
4 others have been engaged in significant historical genetic mixing with other populations.
5 For example, people living on a remote Pacific island in genetic isolation for thousands
6 of years likely would not share Y-STR profiles with people living in Europe, but would
7 share many Y-STR profiles with each other. Even though not geographically remote,
8 some populations tend to mate preferentially with other members of the group and not
9 with outsiders. The geographical remoteness and/or the preferential mating practices of
10 certain populations have resulted in Y-STR clusters. Certain Y-STR profiles are
11 common in some regions of the world or among certain ethnic groups but entirely absent
12 among others. (*Id.*) Forensic scientists attempt to account for this non-random sorting by
13 categorizing profile frequencies in terms of race. (*Id.* at 28, 30.) Probability statistics of
14 a random Y-STR DNA match are expressed and qualified by the race of the individual
15 for whom there is a match. For example, there are categories for Caucasians, African-
16 Americans, and Native Americans. (*Id.*)

17 In this case, Erin Daniel, a criminalist with the Arizona Department of Public
18 Safety crime lab in Flagstaff, examined external genital swabs from the victim, a swab
19 from the crotch of her underwear, and buccal swabs from Defendant's mouth. (*Id.* at 7,
20 19.) The DNA testing of the external genital swabs and the victim's underwear revealed
21 DNA of at least two individuals. (*Id.* at 20.) The major component of the DNA
22 recovered was the victim's own, which potentially blocked the ability to fully observe the
23 other DNA. (*Id.*) Thus, Ms. Daniel examined the sample using Y-STR analysis. (*Id.*)

24 Ms. Daniel utilized the "YFiler" kit, manufactured by Applied Biosystems and
25 made specifically for separating female DNA and copying the Y-chromosome. (*Id.* at
26 15-16.) She generated the DNA profile and found that it matched the profile of
27 Defendant's Y-chromosome on all 16 loci, meaning Defendant and his male paternal
28 relatives could not be excluded as contributors. (*Id.* at 20.) Ms. Daniel then checked the

1 profile against the Applied Biosystems database and determined that the profile has not
 2 been observed. (*Id.* at 20-21.) Based on the size of the Applied Biosystems database,
 3 Ms. Daniel concluded that the Y-STR profile from the crime scene sample is not
 4 expected to occur more frequently than in 1 in 35 Native Americans. (*Id.* at 21.)

5 LEGAL STANDARD

6 The district court determines whether expert testimony is admissible. *See Estate*
 7 *of Barabin v. AstenJohnson, Inc.*, 740 F.3d 457, 464-65 (9th Cir. 2014). Pursuant to Fed.
 8 R. Evid. 702:

9 A witness who is qualified as an expert by knowledge, skill, experience,
 10 training, or education may testify in the form of an opinion or otherwise if:

11 (a) the expert's scientific, technical, or other specialized knowledge will
 12 help the trier of fact to understand the evidence or to determine a fact in
 13 issue;

14 (b) the testimony is based on sufficient facts or data;

15 (c) the testimony is the product of reliable principles and methods; and

16 (d) the expert has reliably applied the principles and methods to the facts of
 17 the case.

18 Rule 702 requires expert testimony to be both relevant and reliable. *Barabin*, 740 F.3d at
 19 463. Testimony is relevant if "[t]he evidence . . . logically advance[s] a material aspect
 20 of the party's case," *Cooper v. Brown*, 510 F.3d 870, 942 (9th Cir. 2007), and reliable if it
 21 has "a reliable basis in the knowledge and experience of the relevant discipline," *Kumho*
 22 *Tire Co., Ltd. v. Carmichael*, 526 U.S. 137, 149 (1999).

23 When assessing the reliability of expert witness testimony, the court should
 24 consider the non-exhaustive factors identified by the Supreme Court in *Daubert v.*
 25 *Merrell Dow Pharmaceuticals, Inc.*: (1) whether the method "can be (and has been)
 26 tested;" (2) whether the method "has been subjected to peer review and publication;" (3)
 27 the method's "known or potential rate of error;" (4) whether there are "standards
 28 controlling the technique's operation;" and (5) whether the method has "general
 acceptance" within the "relevant scientific community." 509 U.S. 579, 592-94 (1993).
 "[T]he test of reliability is 'flexible,' and *Daubert*'s list of specific factors neither

1 necessarily nor exclusively applies to all experts or in every case.” *Kumho Tire*, 526 U.S.
2 at 141.

3 Additionally, Fed. R. Evid. 403 allows the district court to “exclude relevant
4 evidence if its probative value is substantially outweighed by a danger of . . . unfair
5 prejudice, confusing the issues, misleading the jury, undue delay, wasting time, or
6 needlessly presenting cumulative evidence.” “Rule 403 and *Daubert* address different
7 aspects of evidence and therefore act independently.” *United States v. Ramirez-Robles*,
8 386 F.3d 1234, 1246 (9th Cir. 2004). Evidence found reliable under Rule 702 may
9 nonetheless be excluded under Rule 403 “if its probative value is outweighed by its
10 prejudicial impact.” *Id.*

11 DISCUSSION

12 Defendant does not challenge Ms. Daniel’s qualifications to offer opinions on
13 DNA evidence and random match probabilities, nor does he contend that Y-STR DNA
14 analysis or the counting method are generally unreliable under *Daubert*. Rather,
15 Defendant argues the Government has not shown that “Native American” is a
16 scientifically coherent category of genetic classification for purposes of Y-STR DNA
17 analysis. In other words, Defendant contends that the data upon which the Government’s
18 statistic rests is not adequate to produce a reliable result. He seeks to preclude Ms.
19 Daniel from testifying about this random match probability, arguing that the statistic is
20 unreliable under Rule 702, and that its probative value is substantially outweighed by the
21 risk of unfair prejudice under Rule 403.

22 **I. Reliability under Rule 702**

23 There are 105 self-identified Native Americans in the Applied Biosystems
24 database. (Doc. 100 at 29.) The tribal affiliations of the subjects are unknown. (*Id.*)
25 Thus, it is unknown whether any are from the Hopi tribe. (*Id.*) There presently is no Y-
26 STR database known to exist exclusively for Hopis. (*Id.* at 29-36, 80.) Ms. Daniel
27 employed the Applied Biosystems database to determine the random match probability
28 because she had no other database available. (*Id.* at 30-31.)

1 Although she testified that the Applied Biosystems database was peer-reviewed
2 and accepted in the scientific community, Ms. Daniel was unaware of any peer-reviewed
3 articles examining the database or endorsing the pooling of Native American populations
4 for purposes of Y-STR DNA analysis. (*Id.* at 40, 47.) Nor did the Government produce
5 other evidence that pooling Native Americans results in a scientifically accepted category
6 of genetic classification for purposes of Y-STR DNA analysis.

7 On the other hand, Defense expert Charles H. Brenner, who holds a Ph.D. in
8 forensic mathematics and has published peer-reviewed articles on Y-STR DNA analysis,
9 testified that, although there might have been common ancestry among Native Americans
10 going back thousands of years, it is questionable whether there would be any genetic
11 common ancestry among Native Americans today because of the isolation of specific
12 tribes and the natural mutation process. (*Id.* at 53-59.) He testified that, as a result,
13 pooling Native Americans into a single genetic classification could manufacture
14 diversity, thereby inflating random match probabilities to make the DNA profile appear
15 rarer than it might actually be. (*Id.* at 62-63.) Like Ms. Daniels, Dr. Brenner was
16 unaware of any peer-reviewed articles endorsing the pooling of Native Americans into a
17 single genetic classification. But he was aware of research, including a report entitled
18 “Forensic Application of Y Chromosome STRs and SNPs,” authored by Michael
19 Hammer and Alan J. Reed and submitted to the United States Department of Justice by
20 the National Criminal Justice Reference Service, which disapproves of the use of
21 agglomerated Native American Y-STR databases. (*Id.* at 70-73.)

22 Dr. Brenner opined that using the Native American pooled data when the suspect
23 is a Hopi charged with an offense on the Hopi reservation likely results in “a hugely
24 exaggerated statistic,” and that by using the pooled data “[y]ou’ll be framing the
25 suspect.” (*Id.* at 73.) He stated that the only appropriate database to use in a case
26 involving a Hopi man charged with a crime in a population of Hopis would be a database
27 of only Hopi tribe members. (*Id.* at 74.) Dr. Brenner opined that the “1 in 35 Native
28 Americans” statistic generated by Ms. Daniel’s analysis is not reliable because it cannot

1 be known whether the Applied Biosystems database includes an appropriately
2 representative population of any particular Native American tribe. (*Id.* at 80, 90.)

3 The Court finds Dr. Brenner's testimony persuasive. Pooling all tribes into one
4 Native American category risks manufacturing diversity that would not exist in an
5 appropriate database, likely resulting in inflated statistics. The Government, which bears
6 the burden of establishing the admissibility of its expert opinion evidence, has not shown
7 that the data upon which the "1 in 35" calculation is based is reliable. Accordingly, Ms.
8 Daniel will not be permitted to testify about the probability of a random match of the Y-
9 STR partial DNA profile identified on the victim.

10 **II. Prejudicial Impact under Rule 403**

11 Even if Ms. Daniel's testimony regarding the random match probability of the Y-
12 STR DNA profile is admissible under Rule 702, the Court finds that its probative value is
13 substantially outweighed by the risk of unfair prejudice to Defendant. The pooling of
14 Native Americans into a single genetic classification calls into doubt the soundness of the
15 "1 in 35" random match probability. Ms. Daniel acknowledged that certain Y-STR DNA
16 profiles likely would occur with different frequencies within different tribal groups, but
17 could not explain how the formula used to calculate the "1 in 35" statistic accounted for
18 genetic diversity among Native American populations. (Doc. 100 at 30-35, 43, 45.)
19 Without sound population frequency estimates, a jury cannot properly evaluate the
20 weight to be given to Ms. Daniel's findings. *See United States v. Pritchard*, 993 F. Supp.
21 2d 1203, 1214 (C.D. Cal. 2014). Although Defendant can emphasize the limits of Y-STR
22 DNA analysis on cross-examination, there exists a substantial risk that a jury hearing the
23 statistic might give it more weight than appropriate under the circumstances.

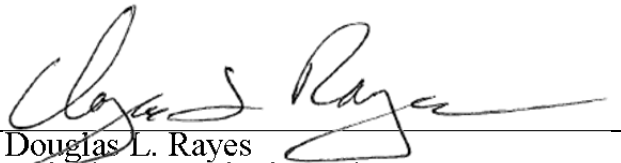
24 **CONCLUSION**

25 For the foregoing reasons, the Court finds that Ms. Daniel's testimony about the
26 probability of a random match of the Y-STR partial DNA profile identified on the victim
27 is not reliable under Rule 702 because it likely is based on unrepresentative data.
28 Further, the dubious reliability of the random match probability would leave a jury with

1 little guidance on how to evaluate the weight to be given to the DNA testing results.
2 Consequently, even if the evidence is admissible under Rule 702, its probative value is
3 substantially outweighed by the risk of unfair prejudice.

4 **IT IS ORDERED** that Defendant's Motion to Preclude Expert Testimony under
5 *Daubert* and FRE 403 and 702, (Doc. 77), is **GRANTED**.

6 Dated this 2nd day of March, 2016.

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10 Douglas L. Rayes
11 United States District Judge
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